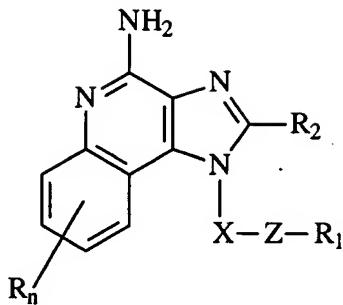


WHAT IS CLAIMED IS:

1. A compound of the formula (I):

5



(I)

10

wherein: **X** is  $-\text{CHR}_3-$ ,  $-\text{CHR}_3\text{-alkyl}-$ , or  $-\text{CHR}_3\text{-alkenyl}-$ ;

**Z** is  $-\text{S}-$ ,  $-\text{SO}-$ , or  $-\text{SO}_2-$ ;

**R**<sub>1</sub> is selected from the group consisting of:

-alkyl;

15

-aryl;

-heteroaryl;

-heterocyclyl;

-alkenyl;

$-\text{R}_4\text{-aryl}$ ;

20

$-\text{R}_4\text{-heteroaryl}$ ;

$-\text{R}_4\text{-heterocyclyl}$ ;

**R**<sub>2</sub> is selected from the group consisting of:

-hydrogen;

-alkyl;

25

-alkenyl;

-aryl;

-heteroaryl;

-heterocyclyl;

-alkyl-Y-alkyl;

- alkyl-Y- alkenyl;
- alkyl-Y-aryl; and
- alkyl or alkenyl substituted by one or more substituents selected from the group consisting of:

5 -OH;

-halogen;

-N(R<sub>3</sub>)<sub>2</sub>;

-CO-N(H)

-CO-C<sub>1</sub> is all

CO. 2. 2. 11.

10 -CO-O-C<sub>1-10</sub> alkyl;

-N<sub>3</sub>;

-aryl;

-heteroaryl;

-heterocyclyl;

15 -CO-aryl; and

-CO-heteroaryl;

each  $R_3$  is independent,  $R_4$  is alkylene or alkenylene, and  $Y$  is  $-O-$  or  $-S(O)_{2}-$ .

20 n is 0 to 4; and

each **R** present is independently selected from the group consisting of C<sub>1-10</sub> alkyl, C<sub>1-10</sub> alkoxy, hydroxy, halogen and trifluoromethyl; or a pharmaceutically acceptable salt thereof.

25 2. A compound of claim 1 wherein Z is  $-S-$ .

3. A compound of claim 1 wherein Z is  $-\text{SO}_2-$ .

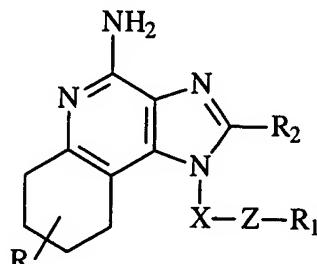
4. A compound of claim 1 wherein  $R_1$  is -alkyl.

30 5. A compound of claim 4 wherein R<sub>1</sub> is -methyl

6. A compound of claim 1 wherein R<sub>1</sub> is aryl.
7. A compound of claim 1 wherein R<sub>1</sub> is heteroaryl.
- 5 8. A compound of claim 1 wherein X is -(CH<sub>2</sub>)<sub>2-6</sub>-.
9. A compound of claim 1 wherein R<sub>2</sub> is H.
- 10 10. A compound of claim 1 wherein R<sub>2</sub> is -alkyl-O-alkyl.
11. A compound of claim 1 wherein R<sub>2</sub> is -alkyl.
12. A compound selected from the group consisting of:  
2-butyl-1-[4-(phenylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
15 2-butyl-1-[2-(phenylthio)ethyl]-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-[4-(phenylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-[4-(methylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-[4-(methylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-2-(phenylthio)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
20 1-[4-(phenylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[4-(methylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[4-(phenylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[4-(methylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
25 2-butyl-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-methyl-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-ethyl-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-hexyl-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-(2-methoxyethyl)-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
30 2-butyl-1-[5-(methylthio)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-[5-(methylsulfinyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-[3-(methylsulfonyl)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine; and

2-butyl-1-[3-(phenylsulfonyl)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
or a pharmaceutically acceptable salt thereof.

13. A compound of the formula (II)



(II)

5

wherein:  $\mathbf{X}$  is  $-\text{CHR}_3-$ ,  $-\text{CHR}_3\text{-alkyl}-$ , or  $-\text{CHR}_3\text{-alkenyl}-$ ;

$\mathbf{Z}$  is  $-\text{S}-$ ,  $-\text{SO}-$ , or  $-\text{SO}_2-$ ;

$\mathbf{R}_1$  is selected from the group consisting of:

- alkyl;
- aryl;
- heteroaryl;
- heterocyclyl;
- alkenyl;
- $-\mathbf{R}_4\text{-aryl}$ ;

10

- $-\mathbf{R}_4\text{-heteroaryl}$ ; and
- $-\mathbf{R}_4\text{-heterocyclyl}$ ;

15

$\mathbf{R}_2$  is selected from the group consisting of:

- hydrogen;
- alkyl;
- alkenyl;
- aryl;
- heteroaryl;
- heterocyclyl;
- alkyl- $\mathbf{Y}$ -alkyl;
- $-\text{alkyl-}\mathbf{Y}\text{-alkenyl}$ ;
- $-\text{alkyl-}\mathbf{Y}\text{-aryl}$ ; and

20

25

- alkyl or alkenyl substituted by one or more substituents selected from the group consisting of:

-OH;  
-halogen;  
-N(R<sub>3</sub>)<sub>2</sub>;  
-CO-N(R<sub>3</sub>)<sub>2</sub>;  
-CO-C<sub>1-10</sub> alkyl;  
-CO-O-C<sub>1-10</sub> alkyl;  
-N<sub>3</sub>;

10 -aryl;  
-heteroaryl;  
-heterocyclyl;  
-CO-aryl; and  
-CO-heteroaryl;

15 each R<sub>3</sub> is independently H or C<sub>1-10</sub> alkyl;  
R<sub>4</sub> is alkylene or alkenylene;  
Y is -O- or -S(O)<sub>0-2-</sub>;  
n is 0 to 4; and  
each R present is independently selected from the group consisting of C<sub>1-10</sub>

20 alkyl, C<sub>1-10</sub> alkoxy, hydroxy, halogen and trifluoromethyl;  
or a pharmaceutically acceptable salt thereof.

14. A compound of claim 13 wherein Z is -S-.
- 25 15. A compound of claim 13 wherein Z is -SO<sub>2</sub>-.
16. A compound of claim 13 wherein R<sub>1</sub> is -alkyl.
17. A compound of claim 16 wherein R<sub>1</sub> is -methyl.
- 30 18. A compound of claim 13 wherein R<sub>1</sub> is aryl.

19. A compound of claim 13 wherein R<sub>1</sub> is heteroaryl.

20. A compound of claim 13 wherein X is -(CH<sub>2</sub>)<sub>2-6</sub>.

5 21. A compound of claim 13 wherein R<sub>2</sub> is H.

22. A compound of claim 13 wherein R<sub>2</sub> is -alkyl-O-alkyl.

23. A compound of claim 13 wherein R<sub>2</sub> is -alkyl.

10 24. A compound selected from the group consisting of:  
1-[5-(methylsulfonyl)pentyl]-2-propyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-methyl-1-[3-(methylthio)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-methyl-1-[3-(methylsulfonyl)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
15 2-ethyl-1-[3-(methylthio)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-ethyl-1-[3-(methylsulfonyl)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-methyl-1-[4-(methylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-methyl-1-[4-(methylsulfinyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-ethyl-1-[4-(methylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
20 2-ethyl-1-[4-(methylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[4-(methylsulfonyl)butyl]-2-propyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-[4-(methylsulfinyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-methyl-1-[2-(methylthio)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-methyl-1-[2-(methylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
25 2-methyl-1-[4-(methylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-ethyl-1-[2-(methylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[2-(methylsulfonyl)ethyl]-2-propyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-{4-[(2,4-difluorophenyl)thio]butyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-{4-[(2,4-difluorophenyl)sulfonyl]butyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
30 2-butyl-1-[4-(ethylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-butyl-1-{4-[(1,1-dimethylethyl)thio]butyl}-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-butyl-1-{4-[(4-fluorophenyl)thio]butyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

2-butyl-1-{4-[(4-fluorophenyl)sulfonyl]butyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-ethyl-1-{4-[(1-methylethyl)thio]butyl}-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
1-{4-[(3,5-dichlorophenyl)thio]butyl}-2-ethyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[4-(cyclopentylsulfonyl)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;

5 1-{4-[(3,5-dichlorophenyl)sulfonyl]butyl}-2-ethyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[4-(cyclohexylthio)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
1-[4-(butylthio)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
1-{4-[(4-chlorophenyl)thio]butyl}-2-ethyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[4-(butylsulfonyl)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;

10 2-ethyl-1-{4-[(4-fluorophenyl)thio]butyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-ethyl-1-{4-[(1-methylethyl)sulfonyl]butyl}-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-ethyl-1-[4-(ethylthio)butyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-ethyl-1-[4-(ethylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
1-[4-(cyclohexylsulfonyl)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;

15 2-butyl-1-{2-[(1-methylethyl)sulfonyl]ethyl}-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-butyl-1-[2-(phenylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-butyl-1-{2-[(4-fluorophenyl)sulfonyl]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-{2-[(1,1-dimethylethyl)sulfonyl]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-{2-[(1,1-dimethylethyl)thio]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

20 2-butyl-1-[2-(propylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-butyl-1-[2-(propylthio)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-butyl-1-{2-[(2-methylpropyl)sulfonyl]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-{2-[(2-methylpropyl)thio]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-butyl-1-[2-(ethylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;

25 2-butyl-1-[2-(ethylthio)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
2-butyl-1-[2-(methylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-methyl-1-[6-(methylsulfonyl)hexyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[5-(phenylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
1-[5-(methylsulfonyl)pentyl]-2-(trifluoromethyl)-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

30 2-(2-methoxyethyl)-1-[5-(phenylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-ethyl-1-[4-(pyrimidin-2-ylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
2-ethyl-1-[4-(pyrimidin-2-ylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

2-methyl-1-[4-(methylsulfonyl)butyl]-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

2-methyl-1-[5-(methylsulfonyl)pentyl]-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

5 2-methyl-1-{4-[(1-methylethyl)sulfonyl]butyl}-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

2-methyl-1-{4-[(4-fluorophenyl)sulfonyl]butyl}-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine; and

2-methyl-1-{4-[(1,1-dimethylethyl)sulfonyl]butyl}-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

10 or a pharmaceutically acceptable salt thereof.

25. A pharmaceutical composition comprising a therapeutically effective amount of a compound of claim 1 and a pharmaceutically acceptable carrier.

15

26. A pharmaceutical composition comprising a therapeutically effective amount of a compound of claim 12 and a pharmaceutically acceptable carrier.

27. A method of inducing cytokine biosynthesis in an animal comprising administering a therapeutically effective amount of a compound of claim 1 to the animal.

20

28. The method of claim 27 wherein the cytokine is IFN- $\alpha$ .

29. A method of treating a viral disease in an animal comprising administering a therapeutically effective amount of a compound of claim 1 to the animal.

25

30. A method of treating a neoplastic disease in an animal comprising administering a therapeutically effective amount of a compound of claim 1 to the animal.

30

31. A method of inducing cytokine biosynthesis in an animal comprising administering a therapeutically effective amount of a compound of claim 12 to the animal.

32. The method of claim 31 wherein the cytokine is IFN- $\alpha$

33. A method of treating a viral disease in an animal comprising administering a therapeutically effective amount of a compound of claim 12 to the animal.

5

34. A method of treating a neoplastic disease in an animal comprising administering a therapeutically effective amount of a compound of claim 12 to the animal.

10

35. A pharmaceutical composition comprising a therapeutically effective amount of a compound of claim 13 and a pharmaceutically acceptable carrier.

36. A method of inducing cytokine biosynthesis in an animal comprising administering a therapeutically effective amount of a compound of claim 13 to the animal.

15

37. The method of claim 36 wherein the cytokine is IFN- $\alpha$ .

38. A method of treating a viral disease in an animal comprising administering a therapeutically effective amount of a compound of claim 13 to the animal.

20

39. A method of treating a neoplastic disease in an animal comprising administering a therapeutically effective amount of a compound of claim 13 to the animal.

40. A pharmaceutical composition comprising a therapeutically effective amount of a compound of claim 24 and a pharmaceutically acceptable carrier.

25

41. A method of inducing cytokine biosynthesis in an animal comprising administering a therapeutically effective amount of a compound of claim 24 to the animal.

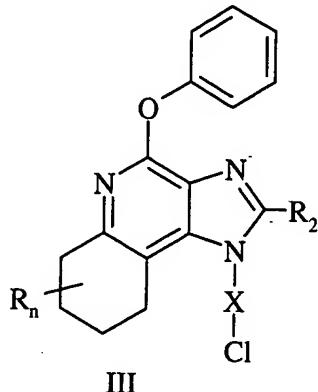
42. The method of claim 41 wherein the cytokine is IFN- $\alpha$ .

30

43. A method of treating a viral disease in an animal comprising administering a therapeutically effective amount of a compound of claim 24 to the animal.

44. A method of treating a neoplastic disease in an animal comprising administering a therapeutically effective amount of a compound of claim 24 to the animal.

5 45. A compound of the formula (III):



wherein: **X** is  $-\text{CHR}_3-$ ,  $-\text{CHR}_3\text{-alkyl-}$ , or  $-\text{CHR}_3\text{-alkenyl-}$ ;

**R<sub>2</sub>** is selected from the group consisting of:

## 10 -hydrogen;

-alkyl:

### -alkeny-

### -aryl:

hater

### heterogeneity

13 -heterocycl;

-alkyl-Y-alkyl;

### - alkyl-Y- alken

-alkyl-Y-aryl; and

- alkyl or alkenyl s

from the group consisting of:

-OH:

hale

NED

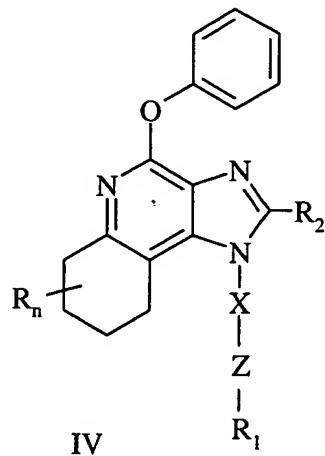
60 MET

卷之三

### CH-CH<sub>2</sub>-alkyl,

-CO-O-C<sub>1-10</sub> alkyl;  
-N<sub>3</sub>;  
-aryl;  
-heteroaryl;  
5 -heterocyclyl;  
-CO-aryl; and  
-CO-heteroaryl;  
each R<sub>3</sub> is independently H or C<sub>1-10</sub> alkyl;  
Y is -O- or -S(O)<sub>0-2</sub>-;  
10 n is 0 to 4; and  
each R present is independently selected from the group consisting of C<sub>1-10</sub> alkyl, C<sub>1-10</sub> alkoxy, hydroxy, halogen and trifluoromethyl;  
or a pharmaceutically acceptable salt thereof.

15 46. A compound of the formula (IV):



wherein: X is -CHR<sub>3</sub>-; -CHR<sub>3</sub>-alkyl-; or -CHR<sub>3</sub>-alkenyl-;

Z is -S-; -SO-; or -SO<sub>2</sub>-;

20 R<sub>1</sub> is selected from the group consisting of:

- alkyl;
- aryl;
- heteroaryl;
- heterocyclyl;

-alkenyl;  
-R<sub>4</sub>-aryl;  
-R<sub>4</sub>-heteroaryl; and  
-R<sub>4</sub>-heterocyclyl;

5      R<sub>2</sub> is selected from the group consisting of:

-hydrogen;  
-alkyl;  
-alkenyl;  
-aryl;  
10     -heteroaryl;  
-heterocyclyl;  
-alkyl-Y-alkyl;  
- alkyl-Y- alkenyl;  
-alkyl-Y-aryl; and

15     - alkyl or alkenyl substituted by one or more substituents selected from the group consisting of:

-OH;  
-halogen;  
-N(R<sub>3</sub>)<sub>2</sub>;  
20     -CO-N(R<sub>3</sub>)<sub>2</sub>;  
-CO-C<sub>1-10</sub> alkyl;  
-CO-O-C<sub>1-10</sub> alkyl;  
-N<sub>3</sub>;  
-aryl;

25     -heteroaryl;  
-heterocyclyl;  
-CO-aryl; and  
-CO-heteroaryl;

each R<sub>3</sub> is independently H or C<sub>1-10</sub> alkyl;

30     R<sub>4</sub> is alkylene or alkenylene;

Y is -O- or -S(O)<sub>0-2</sub>-;

n is 0 to 4; and

each **R** present is independently selected from the group consisting of  $C_{1-10}$  alkyl,  $C_{1-10}$  alkoxy, hydroxy, halogen and trifluoromethyl; or a pharmaceutically acceptable salt thereof.

5      47.     A compound of claim 1 wherein Z is  $-SO-$ .  
48.     A compound of claim 13 wherein Z is  $-SO-$ .